

Student Name: _____

J#: _____

CSC 641 Network Science, Fall 2020

Exam 1 (Take Home: Due: Sept. 24, 2020: 11.59 PM)

Total: 100 pts

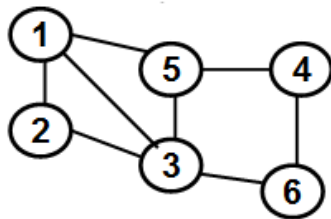
1) (25 pts) For the graph given below:

(a - 5 pts) Find the probability distribution for the degree of the vertices

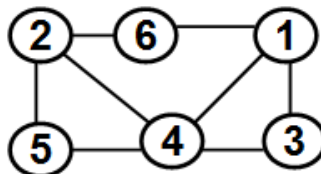
(b - 3 pts) Use the probability distribution of (a) to determine the average degree of the vertices in the graph.

(c - 8 pts) Construct the distance matrix of the vertices in the graph and determine the eccentricity of the vertices.

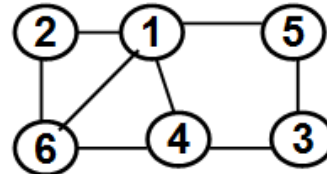
(d - 9 pts) Use the results of (c) to determine the diameter, radius and center of the graph as well as determine the average path length. Can we say the graph assigned to you exhibits small-world property? Justify your answer.



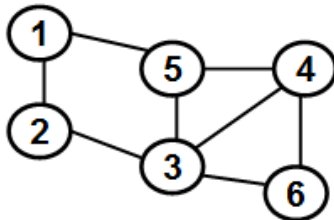
Ahmed Mohammedali



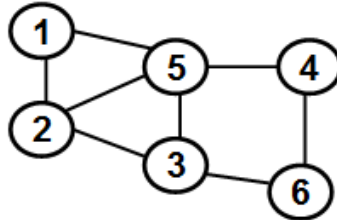
Brittany Morgan



Patrick Pei



Morgan Smith



Ingrid Tchakoua

Student Name: _____

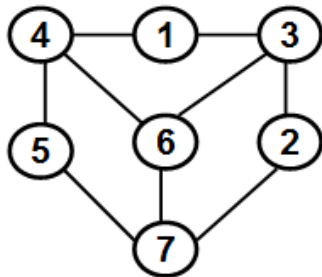
J#: _____

2) (25 pts) The graph given below is bipartite.

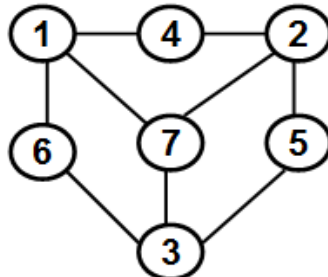
(a) Use the Breadth First Search (BFS) algorithm to determine the two partitions of the graph.

(b) Let the smaller partition determined from (a) be considered as the "Vertex Set" and the larger partition be considered as the "Group Set". Find the Group Projection of the bipartite graph.

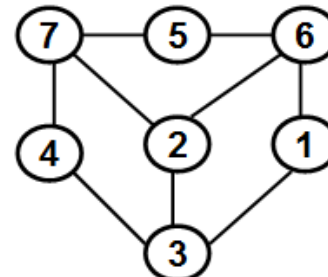
Show all the work.



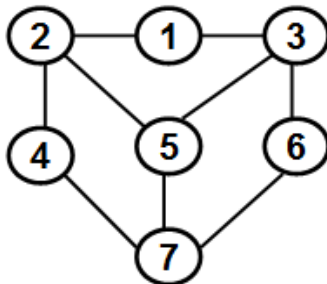
Ahmed Mohammedali



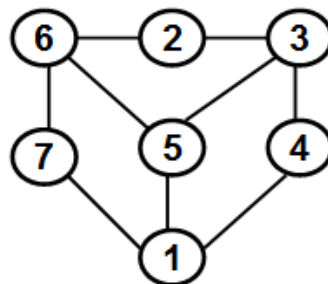
Brittany Morgan



Patrick Pei



Morgan Smith

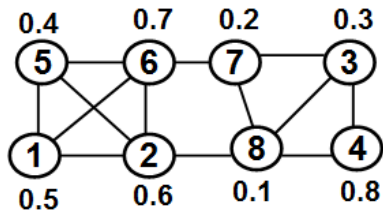


Ingrid Tchakoua

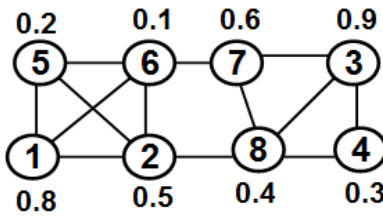
Student Name: _____

J#: _____

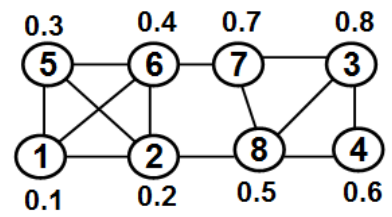
3) (30 pts) Determine the **maximal node matching** and **maximal assortative matching** for the following graph. Determine the following for each of the above: (i) the set of edges constituting the matching (ii) the % of node matches (iii) assortative index of the matching.



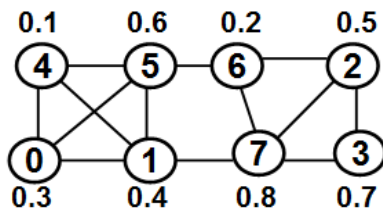
Ahmed Mohammedali



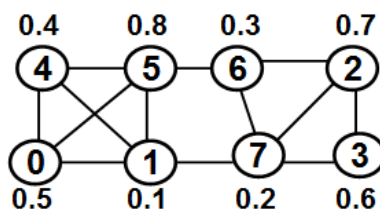
Brittany Morgan



Patrick Pei



Morgan Smith



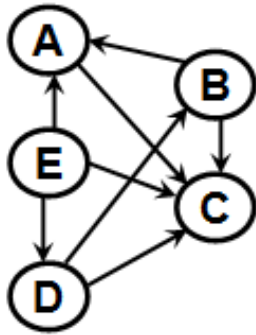
Ingrid Tchakoua

Student Name: _____

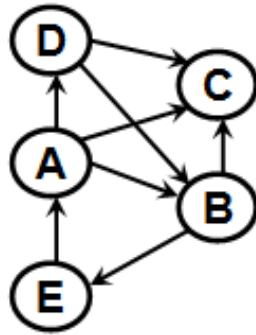
J#: _____

4) (20 pts) For the directed graph assigned to you below, determine the following:

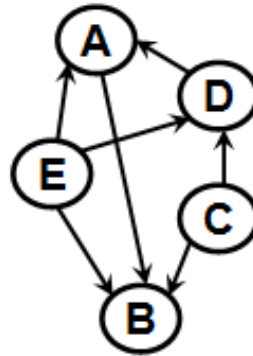
- Cocitation coupling matrix. Determine the pair(s) of vertices that are most strongly coupled.
- Bibliographic coupling matrix. Determine the pair(s) of vertices that are most strongly coupled.



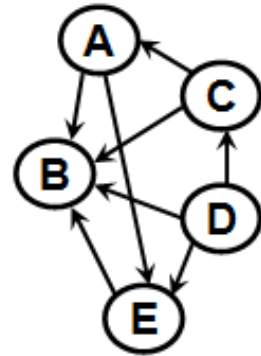
Ahmed Mohammedali



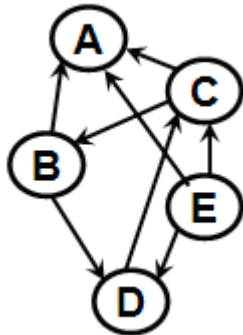
Brittany Morgan



Patrick Pei



Morgan Smith



Ingrid Tchakoua